IMPACT ASSESSMENT STUDY

of the

IDRC FUNDED

THREE STRATA FORAGE SYSTEM,
Bali, Indonesia

Project Number 830227 & 90-0263

By

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1.0 Background

This impact assessment study of the Three Strata Forage System (TSFS) project has been undertake as part of a wider review of the impact that IDRC research initiatives have had over the past 25 years. The intention is to determine the level of impact that has been achieved and the factors contributing to success or the limits thereof, so as to improve the performance of development research initiatives undertaken by the Centre.

The Three Strata Forage System project was selected for an impact assessment because of its apparent direct "relevance to the quality of life of the Balinese people, its strong emphasis on social communication and its potentially strong policy implications". The consultant has been requested to "document and analyze the outputs, reach and impact" of the TSFS with regards to issues of public goods, quality of life and policy development. The aim is to report on what actually happen, in contrast to what was planned to happened, while identifying the factors responsible for greater or lesser, positive or negative impacts than were intended. Factors to be investigated include the general political and socio-economic environment and the research design and implementation.

The TSFS research project was undertaken on the island of Bali, Indonesia, from July 1984 to June 30, 1992.

2.0 Methodology

IDRC provided the consultant with a detailed Terms of Reference, a Framework for the Evaluation of Use and Impacts of IDRC Projects along with a Case Study Report Proposed Format. A methodology for the impact assessment is suggested in the TOR involving a review of project documents along with open ended interviews with relevant IDRC staff, project personnel, collaborating agencies, government institutions and research user and beneficiaries. This methodology and the framework for evaluation have guided this impact assessment of the TSFS project. The consultant reviewed project documents provided by IDRC and obtain from project staff. The consultant also interview 3 project staff, 8 farmers using TSFS, 5 relevant government personnel, 1 non-governmental agencies and visited 4 sites where the TSFS was/is being implemented. The consultant also met with IDRC representative, Dr. Ann Bernard, to discuss the details and scope of the impact assessment.

3.0 Project No./Title.

Project Number: 830227 & 90-0263
Project Title: Three Strata Forage (Indonesia) - Phase I & Phase II

3.1.1 Description of Project

The Three Strata Forage System project developed an agroforestry land use system for the semi-arid regions of Bali which appears to have the potential of providing sustainable increased levels of

income for adopters. TSFS is a formalization and intensification of some components of a more loosely managed traditional livestock raising system. TSFS can be conceived of as a fodder production system consisting of a number of components; introduced plant materials, systematic management of plant resources and proscribed animal husbandry practices. It would be a fair assessment to say that TSFS was primarily developed as a management technology that provided integrated solutions to production and environmental challenges, rather than engaging participants in an understanding of theses issues, or in promoting such concepts as "new concepts" for research or policy development. In the researching of TSFS sound scientific and progressive social research methodologies were employed. The resulting data was comprehensive and encouraging; the latter particularly because it appeared that the TSFS technology was very appropriate for intended beneficiaries. Consequently a rather wide spread interest in TSFS developed and resulted in its inclusion in a number of governmental and non-governmental development programs. However, five year after the end of project an assessment of the impacts of the TSFS suggest that it is nowhere retained as a comprehensive land use strategy and that only partial components of the methodology persist in areas where it has been introduced. The following report documents the impacts that TSFS has had on various individuals, groups and policy system and investigates potential factors that are connected with these impacts.

3.1.2 Objectives

The stated rural development objective of the TSFS initiative was to increase the income levels of participating/adopting farmers. This was to be achieved by increasing the quantity and quality of on-farm fodder,enabling farmers to increase the value of animals produced for the animal product market. It appears that TSFS does afford users of the system, or components of it, to earn increased income.

3.1.3. Strategy

The TSFS project was proposed to IDRC by Prof. I.M. Nitis of the Department of Nutrition, Faculty of Animal Husbandry of the University of Udayana, Denpasar, Bali, Indonesia, as an agricultural development initiative involving 26 farmers in the village of Pecatu, located approximately 35 km south of the University on the Bukit Peninsula of Southern Bali. It was conceived that research conducted on improving the productivity of the animal husbandry systems in this location could produce results appropriate for use in other similarly dry agroclimatic zones in Bali that have been identified as potential areas for semi-intensive beef cattle production. It was also hoped that TSFS would produce results that would be appropriate for use in other similar agroclimatic zones in Indonesia. It is important however to understand that the TSFS project was originally conceived of primarily in technical and economic terms (plant resources for fodder production and resulting monetary returns) rather than as a integrated or holistic community deveopment project.

The approach to TSFS research combined a scientific statistical design to test production input variables and incorporated farmer participation in an on-farm trials setting. The design of the research was conceived in the context of the tree-fodder harvesting practices prevailing in the target

area and in an international development research environment newly interested in agroforestry and on-farm research methodologies.

It seems that in the person of Dr. I.M. Nitis, IDRC was working with a professional capable of the holistic type of research emerging at that time. Certainly at the time of the impact assessment, Dr. Nitis was conversant with the concepts of participatory on-farm research, specifically in identifying the importance of extensive farmer participation in all project activities and in identifying an appropriate entry point for research within the tradition husbandry practices of participating farmers. His sympathy for conducting relevant applied research was evident in his comment that it was necessary that such research first provide solutions that meet the needs of the rural poor and then attempt to determine any scientific basis to them.

3.1.4 Inputs/Activities

IDRC provided $329,410 CAD for the research, development, dissemination and evaluation of the Three Strata Forage System (TSFS) from June 1984 to February 1992. The approximate breakdown of expenditures in percentage by activities/inputs is as follows: 43% Research, 23% Centre Administration (Evaluation, Travel), 12% Salaries & Support Services, 10% Results Dissemination and 8% Capital Costs. In addition to IDRC funds the University of Udayana made in-kind contributions of utility costs and staff salaries amounting to the Indonesian Rupiah equivalent of $70,000.00 CAD. On the whole IDRC input was primarily financial, with technical and managerial contributions provided mainly through recommendations from a major mid-term review at the end of the third year. The competency of the TSFS team was adequate to handle the management of the scientific research and administrative component of the project without external assistance. There were apparently no constraints imposed by the project budget in terms of total amount, budget revisions or in payment schedules.

3.1.5 Context

Prior to the TSFS project, the team leader Dr. I.M. Nitis, had previously been a recipient of IDRC funds in the execution of the Animal By-Products project. By funding the TSFS project IDRC expressed confidence in Dr. Nitis personal professional capacity and that of the recipient institutions where he was a member of staff.

A background on the location of the TSFS research site is an important aspect to the assessment of its impact. Despite the marginal agricultural value of the land of the Bukit Peninsula it has been and continues to be intensively overexploited for food and fodder products. The area is located within the southern tourist zone of Bali, perhaps the most intensive tourist development area in Indonesia. A direct effect of this is that land is continually being sold off for high end tourist development. Increasingly for families living on the peninsula, income earning opportunities are becoming available directly or indirectly in the tourism sector. Within the context of the official zoning it is no surprise that all developments within the area are likely to be perceived by government officials from the perspective of impacts to the tourism sector. This was clearly evident in the comments of

an official from the Regional Development office who was clearly impressed with the visual improvements achieved by regreening (partly the result of TSFS) of the previously barren landscape. Further, rather than see any conflict between agricultural activities in with tourist development, he felt that "agrowisata" (agricultural tourism) could result from effort like that of the TSFS project. For both reason he expressed full support for the TSFS initiative without really knowing the actual nature of it.

One final element of the geopolitics of the project location is its vicinity to Udayana University. Pragmatically the close proximity of the University to the project site meant easy access for TSFS project staff. However given the strong trend towards tourism development in the area it appears these influence are likely to overwhelm any long term impact that TSFS may have had, raising the question of whether alternative locations may have generated more productive results. The TSFS project may have gained the support of various government agency because of the spin-off effects of regreening a tourist zone, but presumably this impact alone would not have been sufficient justification on which initial project funding would have been received.

The TSFS project was implemented in a favourable government livestock production policy environment which was encouraging increased production of Bali cattle for export of stock to eastern Indonesian region and to meet the growing demand for meat products associated with the tourist market.

3.2 Project Outcomes

3.2.1 Outputs (Products, services, processes)

The TSFS project produced a new agroforestry livestock production system, documentation of the research results, numerous additional related publications, provided research opportunities for undergraduate and graduate students, trained extension personnel in the Department of Livestock as well as approximately 298 farmers in its methodology. A total of 30 Department of Livestock personnel from 27 regional offices were trained in the methodology. TSFS further played host to a large number of interested governmental and non-governmental development agencies, resulting in the dissemination and use of the methodology in some of their programs.

The intention of the TSFS project was to produce an improved agroforestry livestock production system that would raise income levels of adopting farmers. The project was successful in designing, testing and evaluating a system capable of achieving this goal. Project documents present comprehensive and extensive scientific evidence of the value of the TSFS to improve soil fertility and conservation, fodder and animal productivity and ultimately farm income. It appears that during the implementation of the project when farmers received cattle gratuitously and were being paid rent for the land used by the experiment they were willing and active in applying the TSFS management strategy. A question to be addressed in section 3.2.3 of this report is whether or not the reported benefits of the TSFS were sufficient that voluntary uptake of the methodology occurred and, after

and beyond the projects immediate reach and duration, what if any sustainable impact TSFS may have.

The TSFS system produced 1 Ph.D. dissertation, 1 Master dissertation, 27 undergraduate papers, 7 journal articles and one paper included in a book. In addition 3 editions of a production manual for the TSFS system were produced. TSFS also received media attention in newspapers, radio and television. Research and publication on the TSFS system has continued following the termination of IDRC funding. Three technical reports have been produced, along with two undergraduate theses on various aspects of TSFS. In addition, the Ministry of Agriculture also produced a production manual for national distribution to its staff in Department of Livestock offices.

It maybe interpreted that the quality of the research outputs and the relevance of its content were both sufficient high to merit the number of resulting publications and the media attention gained. Certainly government and non-government development agencies encountering TSFS publications/publicity and seeking solutions to rural poverty in similarly degraded environments would find it potentially very relevant to their task.

3.2.2 Reach

The presentation of TSFS as a viable sustainable livestock production system and the well documented findings of its positive impacts have generated enthusiasm for the dissemination of the concept and practice beyond the initial 26 farmers of the original project location. As a result of budget items allowing for the presentation of TSFS at national and international workshops, and a supplementary training budget, along with mass media publicity gained, the concept of TSFS has been disseminated nationally within Indonesia, regionally as far as India, the Philippines and Japan and interregionally as far as Central America. The impression of the TSFS on some government and non-government agencies have been sufficient that trials have been initiated by the University of Brawijaya, Malang, Eastern Java, and recently by a network of universities in Eastern Nusa Tenggara, as well as by international development agency in Eastern Bali, Nusa Penida and Lombok.

Users/Beneficiaries

During the implementation of the project the 26 farm families participating in the trials were both users and beneficiaries of the TSFS. Benefits came by way of the rent they received on the area of land they contributed as experimental plots, day wages received for certain project related work such as land preparation and from the receipt of at least one head of cattle gratuitously. In phase II of the project a small monthly incentive was paid out "to ensure farmers participation". Evidently the TSFS project had greatest and most direct economic impact on participating farmers during the actual project implementation period. In other trials funded and conducted by government and non-government development agencies farmer participation also coincided with project incentives, often

in the form of gratuitous cattle.

In the Bukit Peninsula area there has been a spill over effect onto farm neighbouring the experimental area. According to Dr. Nitis some of the most enthusiastic interest in TSFS has come from surrounding farmers who could adopt the components (primarily gliricidia as fodder/fencing material) that were sutied to there needs and resources.

Beyond participating farmer/farm families, the TSFS extended awareness and use of the forage system through a training program involving 298 farmers in 3 districts in the north of Bali.

In terms of gender, all participants in Phase I are listed under the male head of households, while in Phase II 10 of the 16 participating farmers are listed as women. In light of the gender analysis conducted by the project, the division of men to handle the larger livestock (cattle) and women the smaller livestock (goats, pigs and poultry) the gender division in the project phases appear justified.

Delivery Agents

The TSFS project provided opportunities to enhance the educational services and research experience of the Department of Nutrition and Tropical Forage Production of the University of Udayana; for members of the department on the TSFS team implementing the project and university students drawn into to researching and writing on various aspects of it. The academic institutional reach of the project extended beyond Udayana through two theses written by students from the Agricultural Institute, Bogor, West Java. Project staff benefited additionally from the salaries and allowance provided by the project.

Non-university on-site field staff hired by the TSFS project also benefited from the educational impact of exposure to research and project management activities as well a financially from the salaries they were paid.

Complimentary Agencies

The TSFS project engaged in researching a very relevant rural development problem using a progressive methodology and produced results suggesting a viable solution. The writing and publishing capacity of the TSFS team, especially in association with IDRC which actively facilitates information dissemination, resulted in the rather rapid communication of these findings through the international development agency network and government agencies in in contact with with the TSFS project. The impact of this was that there was a wide interest generated for information about TSFS methodology by government and non-government development agencies working on similar rural development issues. The final project document lists 15 visits of individuals from prominent Indonesian government institutions, international and national non-government agencies,

universities, as well as a number of farmer groups and one business. Dr. Nitis expressed that the number of visits that the project has hosted was well beyond this number but no visitors log has been kept. In addition to the institution and agencies listed in the TSFS final report, Dr. Nitis recalled visits by the University of Diponegoro, Semarang, Central Java, the office of the Bupati, East Sumba, local NGO's from Jakarta, Lombok and Irian Jaya as well as international agencies such as Care International, World Neighbours, CUSO (a Canadian Development Agency), and GTZ.

Most recently, both ICRAF and FAO have provided funding for TSFS. ICRAF is funding research on variations of gliricidia planting arrangements (fencing, hedgerows and clumps) and planting methods (seeding vs stake). FAO is interested in including TSFS as part of an economic development project in eastern Indonesia.

In regards to the interest and actual experimentation with TSFS by government and non-government organizations, it should be noted that Dr. Nitis cautioned that the research findings on TSFS at the time were still tentative. However, it was the non-critical enthusiasm for TSFS use by these complementary agencies that led to the contradiction of TSFS being adopted for experimentation by these organizations, though in the end TSFS proved to be of only partial interest to intended beneficiaries.

3.2.3 Impact

Was intended impact achieved?

Users/Beneficiaries

In the narrowest sense the intended impact of increasing the income of farmers was achieved. This was/remains limited to a small number of the project participants and a few other farmers. In the short term project participants benefited from earnings from rent, occasional employment and the acquisition of a least one head of cattle. This was gained by adhering to the specific designs of the TSFS. In the longer run however the economic impact from the implementation of the TSFS project appear likely to come mostly or only from the continued use of components of the system; particularly from the sale of products obtained from Gliricidia - firewood, stakes and seed. This is the case because in the absence of other project incentives farmer have returned to the traditional, though slightly improved, tethering system of livestock keeping. The improved system involves the use of glircidia as a fencing material that simultaneously provides a new source of fodder. This use of gliricidia is in fact the use of only a part of one of the components (introduced plant materials) that make up TSFS and as such this effectively means that TSFS as a technology disappears. In this case there is no real benefit from TSFS as a livestock production system, although as a research project, TSFS introduced farmers to new plant materials that they subsequently benefited from.

There are a number of factors that seem to impede farmers from adopting the TSFS completely. These are:

1. High Establishment costs - The cost of planting material alone amounts to approximately Rp. 400,000.00. In addition, if a farmer does not have cattle a further approximate Rp 600,000.00 is required for the purchase. These cost are inhibitive to the adoption of TSFS by average farmers.

2. The output from the TSFS research was exceeding precise in its recommended ratios of fodder producing components. The need for specific numbers of tree and shrub species as well as specific area measurements for grasses and legumes generated the perception of the system being too rigid. This comment was encountered amongst farmers as well as government personnel and is specifically mention in project evaluation documents. Farmers did not lack training about TSFS, so a lack of knowledge about the technique cannot be the cause of non-adoption of TSFS. Rather farmers expressed an unwillingness to undertake the increased management demands of TSFS and the time this entails. In this regard, the lack of detailed socio-economic data relating to livestock raising prior to research design perhaps contributed to the designing of a technology (TSFS) that lacked the flexibility of the traditional tethering system and required commitment to livestock husbandry that farmers were not accustomed to or willing to undertake.

3.It appears that the complex and intensive nature of stall feeding of livestock in the TSFS system is not appropriate with the capacity/educational level of farmers as well as the overall domestic division of labour employed to generate income. In this regards it seems that contrary to what TSFS documents claim, TSFS does not reduce the time investment into livestock raising. It would also suggest that a 31% increase in income from adoption of TSFS is inadequate to lead to voluntary uptake of the system as a whole.

If, as its appears, farmers are reluctant to adopt TSFS entirely, then the benefits claimed for TSFS remain *academic*. The hoped for impacts of a sustainable livestock production system that provided increased economic returns and environmental conservation has not been achieved. This maybe partly due to the fact that it offers too little in regards to the overall prevailing economic and environmental conditions and the small positive impacts that it might have are erased by factors such as overall excessive stocking rates as occur in the Bukit Peninsula area.

The use of project incentives is another factor that has effected the impact of the TSFS project. On the one hand it maintained farmer participation so that the scientific research could be concluded. On the other hand incentives seem to have masked the degree of self motivated inherent interest that farmers may have had in such a design. As it turns out, the TSFS project has succeeded in a sound assessment of the potential of this production system, but suffers the same fate as many technologies; that of not been wholly appropriate to intended users. In this regard the incentives could be seen as supporting activities of little relevance to farmers but of prime importance to the Delivery Agency. Since in the end TSFS appear to nowhere be adopted as a complete system, the questions can be raised that TSFS research would have perhaps evovled a more appropriate fodder system if it followed a path more determined by farmers volunteer participation. As it is, now that the formal scientific research on TSFS has been completed and the development and extension phase have begun, it would be fair to say that research directed by farmers priorites is only now potentially beginning.

Further the use of incentives has potentially a negative social impact in regards to undermining the traditional work cooperation ethic, "gotong-royong", which Bali is famous for. Where volunteer cooperative community work contributions are a norm it is quite peculiar that the TSFS had to rely on incentive so heavily for its implementation. While it is understandable to pay farmers for specific research actitivites for which they gain no return (i.e. regularily weighing cows to assess weight gain), in terms of long term sustainability, TSFS would have faired better had it paid closer attention to where farmers were willing to make volunteer contributions as a signal indicating what they would be willing to do on their own after the project's completion.. The difficulty in obtaining voluntary participation should have informed the project that perhaps the TSFS design was unsustainable without project incentives.

Another factor that can be cited pertaining to the limited impact resultant from the TSFS project pertains to the use of the socio-economic data generated by the project. It is clear that the project did not begin with a comprehensive study of the cultural and socio-economic dynamics of the community. In fact the professional skills to conduct appropriate socio-economic research were unavailable to the TSFS team at the time the project was initiated. The apparent appropriateness of the TSFS research at the time of its conception appears to be based on only a few narrow observation of traditional fodder harvesting practices, rather than a more comprehensive understanding of livestock raising in the domestic and community context. The need for a more in-depth understanding of the entire farming/household system was only recognised in the course of the research implementation when the intial research indicated that TSFS would be technically feasible. When towards the end of the first phase qualified staff became available a short two week study was undertaken. The information generated by this study was well document but, never had an impact on the actual design of the research. Certainly the technological design of TSFS did not change as a result of this information, nor did the types of activities required of participating farmers. It was the nature of the scientific research design in its need for consistency, replication and repetition in order to be valid, that prevented the incorporation of new information, except in very minor ways, into the overall project design .

Women's Participation

Overall the concern for gender related issues was limited to how labour was divided between men and women in the care of livestock. In phase I, all particpanting farmers are listed as male even though most of the work involved in fodder harvesting and stall feeding was the responsibility of women members of the family. The inclusion of women farmers in the second phase of the TSFS project was an acknowledgement of the important role women play in livestock keeping, especially in the raising of goats. However, over the entire duration of the project no training on TSFS was provided directly to women participants. They received instruction on TSFS from male family members (usually husbands/fathers) who attended training sessions. Although women did make some minor contributions to research activities (i.e. seed sorting techniques) a true gender analysis of the impact of TSFS on women was never conducted. The question of productive modification of TSFS suited to the needs and resources of women was therefore never ask/answered.

Policy Systems & Programs

Government departments have demonstrated interest in TSFS through the promotion of its use in appropriate agroclimatic regions by the production and distribution of a TSFS production manual and by financing the training of 30 Provincial Livestock officers in the TSFS methodology. In this way, TSFS has been incorporated into government livestock programs in all provinces, as one anomg other forestry and agroforestry (livestock) practices, though it is not the cause of government policy nor is TSFS made specific mention of anywhere in policy statements.

While in general TSFS appears to have been favourably received by appropriate government institutions, the project potentially could have had a more definite impact on policy formation, i.e. specific mentions in policy statements, if the project had engaged relevant government departments as research partners. As the project was conducted however, government was not an active participant in the research but, rather, only a recipient of research results. More ownership of the research result would potentially be a force to increase policy impact. As a result, TSFS has not been sufficiently influential to have TSFS recognized, by specific mention, in the official land use policy for the regency of Badung. Further, the absence of real government support is evident by the absence of any allocation of government budget resources for the replication of TSFS in either the regency of Badung, Bali, or elsewhere in Indonesia.

Finally, the comments of an official from the Provincial Livestock Department perhaps sums up the interest in TSFS but the lack of impact it has had on government policy. The official described TSFS as being theoretically interesting but that it proved difficult to implement. He added that if TSFS has been an appropriate livestock raising system it would have been readily adopted by businesses in the private sector that the Department had introduced to the method, but that this had not happened.

NGO Projects

The active interest of NGO's in TSFS is clear from the number of cases where TSFS has readily been introduced (as a complete package) into development projects. In some case such as in East Java, Sumba and East Bali, the TSFS team was directly involved in the training of interested parties. In other cases such as with PPSTN in Lombok, the NGO undertook the familiarization of TSFS on its own. The interest of NGO's in TSFS should not however be mistaken as meaning that TSFS is a successful technology. A distinction needs to be made between the appropriateness of TSFS as a potential tool for the development efforts of NGO's and the actual appropriateness to the ultimate users. In the end TSFS appears to be of greater interest to development researchers/professionals than to farmers. This is clear from the fact that there is no evidence that farmers participation in NGO projects using TSFS are anymore willing to manage TSFS as it is designed then farmers at the original research location.

Capacity Building

From the design of the TSFS project it is evident that capacity building would occur mostly at the level of the TSFS team as a consequence of the activities required to implement the project. Previous to the TSFS project however the technical and management capacity of the members of the team were already advanced and as a result TSFS only offered an additional opportunity for further experience.

At the community level, TSFS appears not to have had an explicit goal of developing the social-institutional capacity of participants. Farmers groups were established to deal specifically with TSFS implementation, and the meetings of these groups did provided some experience for participants. However, after the projects completion the groups no longer continued to operate, though they can be reactivated when there is the need for it i.e. project extensions. The TSFS projects provided a narrow range for capacity building of technical skills specific to TSFS issues. According to Dr. Nitis, any social organization skills that farmers groups working with the TSFS project have acquired is to be attributed to various other government and non-government community development projects/programs and not to the TSFS project.

In regards to field workers, a similar assessment can be made. Field workers gain particular technical experience working with the TSFS project, but seem not to have been exposed to broader skills in community animation and facilitation that would be transferable to issues other than and after the completion of TSFS project.

Unintentional Impact

The only unintentional impact that appears to have been achieved is the benefit toward "regreening the tourist zone". As a result of the promotion of the use of Gliricida for fencing material, the Bukit Peninsula area, even during the dry season, does retain some greenery. Further, as a result of the more visually pleasant environment, TSFS had a positive impact on the attitude of government officials towards TSFS activities in the area.

What role did IDRC have in bringing about or mitigating helpful or hindering factors?

IDRCs role was largely limited to providing financial support. This was the case because the local recipient institutions had both the technical and managerial capacity to implement the project. It can be said that IDRC supported a capable research team dedicated to conducting progressive appropriate applied development research, at a time when encouraging farmer input into research designs was new. Dr. Nitis noted that IDRC respected the independence of the TSFS team to take decisions on the development of the project research.

The fact that TSFS turns out not to be a viable system for its intended clients however suggests that

closer supervision and input from IDRC could have resulted in a more useable product. The consultant for this impact assessment did not have access to the project review conducted at the end of Phase I, but if the numerous recommendation made in the evaluation of the TSFS project in 1993 were addressed during the course of the project greater impact may have been achieved. In fairness however, implementation of many of these recommendation would have significantly altered the projects original scope and required additional financial and human resources.

Impacts beyond the project

Interest in TSFS certain extended beyond the TSFS project location. This was achieved partly by a supplementary budget to the project for this purpose, but also via the public mass media and media network within the development community in Indonesia and in S.E. Asia. As a result of this TSFS has been experimented with, and continues to be experimented with in a number of different locations: northern & eastern Bali, Nusa Penida, East Java, Nusa Tenggara. The use of TSFS in these other locations is at various stage from post project phase to new trial stages. In the post project phase the outcome of trials in other locations seems similar to that observed in the Bukit Peninsula where farmers retain only some components of the system, rather than the entire practice.

As a result of the dissemination of the TSFS methodology by NGO's and GO, in some ways TSFS is better known outside of the Bukit Peninsula than among non-participant farmers there.

Negative Impacts / Consequence on non-use

There do not appear to be any significant or important negative impacts associated with the implementation of the TSFS project or in the use of TSFS or components of it. The only potential negative social impact relates to monetary incentives used by the project as undermining the tradition of the community voluntary participation.

The consequence on not using TSFS is a return to a traditional tethering system and continued environmental degradation. It would appear that non-use equates to less investment into livestock raising and more free time for other economic or non-economic activities, in spite of any negative environmental impacts this will have in the longer term.

Enhanced Outcomes

With hindsight it would appear that the impact of TSFS project could have been enhanced by a better understanding of the socio-economic behaviour of the household involved; particularly with regards to the investment/return level that would entice voluntary uptake. It seems that TSFS as a complete production system is ultimately too complex for the returns it generate to be appropriate, although the researching of the TSFS has had spin offs that farmers continue to use and benefit from.

A second factor regarding impact enhancement relates to the location of the project. It seems that

the Bukit Peninsula was less than an ideal location because the local economy is going through such a transition as a result of the developing tourism sector. This creates influences that tend to disinterest household in a complex system like TSFS. If the TSFS project was conducted in a location where livestock raising was more central to the domestic economy then "buy in" and "voluntary uptake" may have occurred. In this regard the assistance that the TSFS team extended to a community development project funded by Plan International in Eastern Bali is notable. The Plan International Project involved farmers in the villages of East, Central and West Seraya in Eastern Bali who have a tradition of stall feeding their cattle. This is in contrast to Pecatu where the tradition was to tether livestock on private or common lands. As a result the stall feeding component of the TSFS system was not an obstacle to the use of TSFS for Seraya farmers as it appears to be for farmers in Pecatu. The farmers in Karangasem benefited from the introduction and use of gliricidia as fencing and fodder material and of the new grass species introduced with TSFS. They have not however adopted the specific planting regimes recommended by TSFS, opting instead to plant fodder material around their holdings and cut and carry it to the stall when necessary. If the initial TSFS research had been on farming system more like that found in Eastern Bali the development of the TSFS design might have proceed along different lines and produced more appropriate recommendations. In the end however, farmers neither in Pecatu or Karangasem adopt TSFS as it is recommended in literature produced by the project.

Perhaps the most important factor that would have enhanced the TSFS project in terms of the appropriateness to 'intended users' would have been a shift in research design priority away from the primary interests of the academic/scientific institution which was the Delivery Agency to that of the intended 'benificiaries'. However it should be noted that academically accepted participatory research methodolgies were only in the early development stage at the time of the conception of TSFS.

3.4 Public Relations

With the low and only partial adoption of TSFS, TSFS does not have the makings of a research success story. It is more like the fate of the much publicised alley cropping system that captured the imagination of development professionals but was little use to intended users. However, in the context of conducting development research in a dynamic environment which evolves to include an expanding number of issues, TSFS is a good example of the issues that conducting such research raises and the challenges remaining between institutionally dominate vs participatory based research. The broad impact of the TSFS project stated in terms of the development from a traditional tethering livestock keeping practice to a improved tethering system following the TSFS intervention is communicable as a farmer modified research effort.

4.0 Summary

4.1 Methodology

The methodology suggested by IDRC for the impact assessment is appropriate to its purpose. The framework provided for the assessment is likewise appropriate and useful. The questions provided which the assessment sought to answer are pertinent. However, because the nature of impacts are so difficult to assess, as is acknowledged in the Concept Paper provided for the consultancy, greater investment is necessary to be able to increase the confidence of the results. A more comprehensive impact assessment should entail an impact assessment team, similar to that used for the final evaluation of the project in 1993, to enable a more detailed assessment of the varying interdisciplinary aspect of the project work.

With regards to methodolgy, one other comment is appropriate. In faimess to the TSFS project it should be noted that many of the effects that this impacts study sought to assessment where never conceived as goals or objectives of the project.

4.2 Project Components

It is fair to state that the objectives and strategy of the TSFS project were derived primarily from the perspective of the capacities of the project fund recipient, the Department of Nutrition, Faculty of Animal Husbandry, rather than from a more objective context obtained by the prioritization of issues delineated by the community itself. After the completion of the project it remains unclear what the communities social and economic priorities are and where in that hierarchy livestock raising interests are. In this regard the more recently developed techniques using Participatory Rural Assessments are recommended to define where the communities greatest needs and therefore motivation and interest lie. IDRC would be prudent in insuring that a more comprehensive assessment of community needs, as is obtained by the use of a methodology such as PRA, is made prior to sectorial specific projects like TSFS. As a comprehensive land use system, TSFS was conceived in an overly academic context and it seems that its impact will largely remain so. The benifits to 'end users' appear to occur mostly from spill over effects from the main thrust of the reseach. This of course is not a negative outcome, it only suggests that research could have been more suitably targeted.

4.3 Results

The TSFS project has produced a well documented piece of research on a potential sustainable land use system. It has provided good estimates of the biological capacity of the system. However, TSFS appears to have been much less successful in meeting the more difficult goal of integrating the technique with prevailing socio-economic conditions. As a result the sustainability of TSFS will remain only as a research finding. What does persist in the natural and social environment after the completion of the TSFS project is an increased use of MPTS in the farming system; in particular the use of Gliricidia, as a fencing material, fodder and sellable planting material.

While the TSFS research initiative cannot be consider wholly successful, the objectives that it

attempted to achieve remain a high priority for development workers and researchers. TSFS has made a partial contribution towards the realization of this goal of integrating community economic development with environmental conservation. In some ways it is only now that TSFS is moving to the development and extension phase that research appropriate to the needs and resources of the 'end users' will begin to be conducted With the continuing interest of governmental and non-governmental organizations to experiment with TSFS the necessary modification to make it more appropriate for widespread adoption may yet be achieved. To improve the community development impact of further TSFS initiatives I would make two recommendation for the future development of TSFS. The first would be that an appropriate generic version of TSFS needs to be defined, which, at the same time allow for site specific modifications to be made. Secondly, and most importantly, the development of an appropriate version of TSFS should be a collaborative venture involving the University, Government & Non-Government organization and farm families to insure that TSFS is appropriate to the needs and resources of the community as well to any institutional goals.

ATTACHMENTS

Schedule of Meetings

Name	Date (1997)	Time	Place	Subject/ Activity
Dr. I.M Nitis	Thurs. Sept 4	3:00 - 6:00pm	Udayana University	General Description of TSFS project
I. Gust. Md. Supartha, Head of Reseach Section Bappeda Office	Fri. Sept 5	8:00 -9:00am	Bappeda Office (Denpasar)	Perception, value & support for TSFS methodology
Pk Djatra Livestock Production Dept	Fri. Sept 5	9:30 - 10:30 am	Provincial Livestock Office (Denpasar)	Awareness of and support for TSFS methodology
Pk Pujawan, Head Livestock Production for Distirict of Badung	Fri. Sept 5	11:00am -12:00 pm	Regency Livestock Office (Denpasar)	Awareness of and support for TSFS methodology
Ibu Made / Pk Made TSFS Field Workers	Fri. Sept 5	12:30pm - 3:00pm	Village of Pecatu & Demo Plot	General orientation to project site and activities
Dr. Ann Bernard IDRC Representative	Sat. Sept. 6	9:00 - 10:30 am	Hotel Century Jakarta	Details and Scope of Impact Assessment
Two Farmers I. Ketut Sadri *I. Ketut Kadra*	Sat. Sept 6	4:00 -6:30 pm	Pecatu - TSFS project site	Tour of project area and discussion with two participating farmers
Ibu Darmi & Family TSFS participants	Sat. Sept 6	6:30 - 7:30pm	Pecatu village household	Traditional farming practices & interest & impact of TSFS especially with regards to women
In. Hasbi Project Coordinator PPSTN, Lombok	Wed. Sept 10	1:00 - 3:00pm	PPSTN Office, Mataram	Interview regarding the use of TSFS by the PPSTN project in Lombok
Made Badra Livestock Field Officer	Sat. Sept. 20	8:00 - 9:30 am	Regency Office of Horticultural Department Karangasem, East Bali	Personal understanding of TSFS and its institutional use & impact
I. Ketut Jineng Village Head	Sat. Sept. 20	10:30 - 11:30 am	VillageOffice Central Seraya, East Bali	Awareness and impact of TSFS

I.Wayan Landra Head of Farmer Group - along with two other farmers	Sat. Sept. 20	11:30 am - 1:00 pm	Satya Budhi Karya Farmers Group, Central Seraya, East Bali	Understanding , adoption and difficulites with TSFS
Dr. I.M Nitis	Mon. Dec 8	10:00am -12:30pm	Udayana University	Follow up questions

The following is a list of publication provided by Dr. I.M. Nitis to the Consultant:

General Descriptions of TSFS

Sistem Tiga Strata
Oleh: Panitia Penyuluhan STS
Departamen Pertanian
Bali Informasi Pertanian 1990/91

Petunjuk Praktis
Tata Laksana Sistem Tiga Strata
oleh: Team Penyuluhan STS
Universita Udayana
Fakultas Peternakan
Jurusan Nutrisi Dan Makanan Ternak
Denpasar, Bali, Indonesia, 1989

Petunjuk Praktis
Tata Laksana Sistem Tiga Strata
oleh: Panitia Penyuluhan STS
Universita Udayana
Fakultas Peternakan
Jurusan Nutrisi Dan Makanan Ternak
Denpasar, Bali, Indonesia, 1990

Petunjuk Praktis
Tata Laksana Sistem Tiga Strata
oleh: Panitia Penyuluhan STS
Universita Udayana
Lembaga Penjadian Kepada Masyarakat
Edisi Ke 3 Revisis
Denpasar, Bali 1995

Petunjuk Pengembangan HMT
Di Lahan Kritis
Oleh: Subdit. Pakan Hijauan
Diterbitkan Oleh:
Directorate Jendenral Petenakan
Dept. Pertanian,
Jakarata, 1994

Techical Reports:

Gliricidia for Goat Feeds & Feeding in the Three Strata Forage System
TSFS Team
Udayana University
Faculaty of Animal Husbandry
Department of Nutrition & Tropical Forage
Science
Denpasar, Bali, 1993

Performance of Nuring BALI Heifer and its Calf Under Three Strata Forage System
Udayana University
Department of Nutrition & Tropical Forage
Science
Denpasar, Bali, 1996

Oestrus Cycle & Gestation of Bali Heifer Under Three Strata Forage System
Udayana University
Department of Nutrition & Tropical Forage
Science
Denpasar, Bali, 1995

Growth and Reproduction & Performance of Bali Heifer Under Three Strata Forage System
Udayana University
Department of Nutrition & Tropical Forage
Science
Denpasar, Bali, 1994

Thesis Research

Tingkat Adopsi Petani dalam Proses Difusi Teknologi Hijauan Makaa Ternak Sistem Tiga Strata (HMT STS) di Bali
Program Pascarasarjana, Institut Peranian,
Bogor, 1992

Pengaruh Bentuk Cetak dan Macam Bidang Cetak Pesan Pada Kalendaer Mehja Terhadap Peningkatan Pengetahuan Petani Peternakan Tengtan Inovasi Sistem Tiga Strata Di Kecamatan Kedunjanjan, Pabupaten Lumanjan, H\jawa Timor
Oleh: Wahjoe Widhijanto Baskui
Program Pascarsarjana
Institue Pertanian Bojor, 1996

Other

Calander of STFS Methodolgy
Program Studi Peranian Dan Pedesaan
Institute Pertanian Bogor